Hudson (E. D.)

THE LIMITATIONS

OF THE

DIAGNOSIS OF MALARIA

BY

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THE LIMITATIONS OF THE DIAGNOSIS OF MALARIA.[1]

THE diagnosis of a disease, or a conclusion as to the morbific influence which has determined a group of existing symptoms, should be reached by study of the laws and phenomena of the malady or of the materies morbi in question, as presented in typical cases. There is so much room for indefinite inference and unconfirmed theory in medicine that conservative physicians will always receive with caution, and only after careful scrutiny, all diagnoses of irregular or typical forms of disease.

This conservatism should be exercised nowhere, perhaps, with more vigor than with reference to malaria and malarial disease, since in malaria we have an unseen and impalpable agency. It is true that the discovery of the *bacillus malariæ* in marsh air in 1879, by Klebs and Crudeli, its culture and transmission by inoculation to lower animals, and the further detection by them and later observers of this bacillus in the human blood, give promise of a future possible means of exact diagnosis of malarial toxæmia.

But at present the malarial bacillus is exceptionally demonstrated in the blood of pronounced malarial cases, and by different microscopists with such discrepancies as to appearance that it cannot be included as a factor in diagnosis. Like the waxy infiltrate, which neither chemistry nor the microscope have yet detected in the blood,

[1] Read at the Section on Practice of Medicine, New York Academy of Medicine, May 19, 1885.

though its blood origin is inferred unerringly from its method of deposition and relation to visceral nutrition, so malaria, though undefined and undescribed, as an entity or potentiality, still is positively recognized by its typical manifestations as having invaded the system.

Its origin in the earth, its relation to decaying vegetation, its presumably cryptogamic nature, the laws of its dissemination by air and water are recognized; but as yet malaria itself has not been detected. The several designations *intoxication tellurique*, *malaria*, marsh miasm, however, apply to a cause of disease, which is accepted with singular unanimity by scientists, and by all classes of practitioners, and the public.

In hazarding a diagnosis of malaria, we must be guided by well-formulated rules and closely adhere to them. They must refer to evidence of exposure, the usual method of its invasion, the usual sequence of its symptoms, its progress by periods and stages, its sequelæ, and the confirmatory evidence of physical diagnosis, as to change in size and structure of the viscera. These evidences may all be present, associated or consecutively, or only in limited number characteristically grouped, or finally there may be but a single isolated symptom or sign possessing diagnostic value.

It would be undesirable to review all the features of typical malarial fever, as present in the quotidian or tertian intermittent, or in remittent fever. Suddenness of onset, rigor, subsequent fever, with an elevation of temperature disproportionate to the short period of sickness and amount of tissue waste, a speedy subsidence, with sweating, a notable relief of acute symptoms in the intermission, periodicity of recurrence, and enlargement of the spleen, are the essential features. Many others may coexist and strengthen the history of the disease. The diagnosis of typical malarial disease is thus made with unerring certainty. But when only lesser symptoms, individually or in groups, are present, and especially symptoms which may result from other causes than malaria, we have

need to exercise the utmost scrutiny, and should eliminate each and every such cause before asserting the toxæmic presence of malaria. It may be stated thus: Before diagnosticating a morbific origin in an invisible, inappreciable, and inferred cause, which, if present, is manifested by its typical symptoms, we must search for other and known causes of these same symptoms, causes which, if present, are demonstrable. The exclusion of these definite causes leaves the just inference that the less demonstrable cause exists.

I would also protest against giving undue weight to the therapeutic argument. The cure of a sickness or the alleviation of its symptoms by a remedy or remedies which specifically cure malaria, does not warrant a diagnosis of malaria, when the symptoms are atypical, and when the medicine is known to be beneficial in other morbid processes, as in fever and inflammation. In most systematic treatises it has been customary to group the atypical cases of malaria under two heads: 1, Masked intermittent; 2, chronic malarial infection. The former group includes cases in which there is less danger of error or a hasty inference of malaria than in the second, since periodicity is the characteristic feature and chiefly determines the diagnosis.

A reference to numerous authors will disclose an extended list of general symptoms and local disorders, regarded, by reason of their periodic recurrence, as dependent either wholly upon malaria, or as regularly aggravated by its influence. Thus of the nervous system, malaria may cause periodically: convulsion; coma; coma-vigil; hallucination; delirium; mania; insomnia; aphasia; aphonia; hemiplegia; paraplegia; paralysis of tongue; paralysis of deglutition; anasthenia of nerves; neuralgia, trigeminal, occipital, intercostal, sciatic, lingual, cardiac, gastric, intestinal, and indeed neuroses of almost every nerve in the body. It is pretty generally conceded that trigeminal neuralgia, especially of the ophthalmic division, either periodically present or aggra-

vated at definite intervals, is the most frequent form of the masked intermittent.

Of the diseases of the eye, malaria has been asserted to be causative, in individual cases, of amaurosis, amblyopia, nyctalopia, iritis, ophthalmia.

Periodic deafness has been noted.

Of the respiratory diseases, there are enumerated instances of asthma, pleurisy, pneumonia, hæmoptysis, phthisis directly attributable to malarial poison.

The heart rhythm, it is conceded, is often notably deranged, its force and frequency inhibited by malarial influence upon the nerve-centres. Exacerbations marked by typical periodicity, or the periodic recurrence of the disease in full, stamp as malarial many cases of indigestion, vomiting, diarrhœa, dysentery, icterus.

So, too, dermatologists have noted cases of erysipelas, purpura, roseola, urticaria, pemphigus, which have presented evidences of dependency upon malarial infection.

Renal engorgement with intermittent hæmaturia is a common feature of malaria in some parts of this country, especially in Mississippi.

Indeed, it is hardly necessary to enumerate the varied disorders to which malaria may lead, since it is recognized as a ferment vitiating the blood, provoking fever, and increasing tissue-waste. The irritation of nerves by vitiated blood, and the local hyperæmia consequent upon raised temperature and vascular excitement, will account for the widest distribution of neuralgic pains, for paresis, paralysis, and various general and limited visceral inflammations.

In each and every one of the above enumerated and all other maladies the presence of malaria, as a cause or as a complication, may be inferred: First, when other and usual causes are not apparent; second, when periodicity and other evidences of malaria, as dusky face and increased splenic area, co-exist. But without these or other recognized malarial symptoms the diagnosis is but a surmise.

I am averse to the prevailing fashion of the day, to ascribe vague symptoms—such as bodily languor, morning lassitude, persistent yawning, soreness of the muscles, bilious tinge of the skin and conjunctiva, coated tongue, eructations, torpid liver, sluggish bowels — to malaria. The diagnosis, in the last generation, of "liver disease," or "biliousness," was equally a makeshift to cover inexact knowledge, but was often much nearer the truth, since the indigestions are most frequently the cause of all the above-named symptoms.

The second group of atypical malarial disease, that of chronic malarial infection, is made to include most of the above vague symptoms. Whether symptoms are definite or indefinite, if splenic enlargement alone can be demonstrated, a diagnosis of chronic malarial toxæmia is fully justifiable; the association of fulness of the liver, of cachetic facies, bilious hue, indigestion and general innutrition, debility, and malaise further strengthens the conclusion.

But in many sections of our country, but slightly infected, as New York, these manifestations of chronic malaria are less pronounced, the spleen is questionably increased in size, the liver is unchanged. The diagnosis, then, is difficult, and demands a review not only of prominent symptoms, but of every point touching the possible presence of malaria.

What are the reasonable proofs of malarial infection?

1. The history of a residence in a malarial district, or some known exposure to malarial emanations.

Where malaria exists in a virulent form, constantly developing numerous typical intermittents and remittents, the inference is warrantable that many or most other diseases and all cases of indefinite type are influenced by the prevailing infection. Such a region was Batavia, N. Y., which, as described by Waring, was threatened with depopulation by malarial disease, though subsequently rendered healthy by efficient drainage. Certain suburbs of New York, as portions of Staten Island, the valley of

the Hackensack, the Palisades, are so malarial as to develop all the pronounced evidences of chronic malaria.

In our city limits it was once customary to state that malaria was rarely engendered below Fiftieth Street. But there are evidences of the incorrectness of this statement. Isolated and grouped cases in various parts of the city point to local sources of malaria. The extensive belt of filled land which surrounds the city, with consequent extension of the sewers out through marshy land, has added a source of infection. Constant excavations—as for deep cellars, for the columns of the Elevated Railroads, for the large water-pipes—are constantly provoking malarial seizures in the workmen exposed and in the residents at the exposed points. We cannot doubt that the same influences to some slight extent leave a chronic malarial contamination. We have another possible source of danger from malaria in our water-supply. Investigation will show that the residents along the water-shed of the Croton River and in the region of the Croton Lake suffer from malaria. My attention was first called to this fact by private patients who had summered at the Croton Lake until driven home by severe chills. I believe that malaria may reach us by our water-supply. We are warranted in this opinion by data as to the Mohawk and many other valleys, to which malaria has been conveyed from its habitat to places receiving the water-shed of a malarial region, yet having no swamps or other soil of their own favorable to malaria. The cerebro-spinal fever of 1872 in this city was associated with a remarkable presence of decayed leaves and vegetation in our water.

The present season has witnessed an unusual prevalence of "winter diarrhœa," so characterized by elevation of temperature and evidences of periodicity as to warrant a malarial element. The geographical distribution of the cases in different parts of the city, and the circumstances as to habits, occupation, diet, etc., of the patients, have left but one inference, or as the most plausi-

ble inference, the water-supply. During the past year I have advised families, especially those having young children, to boil drinking-water as a means of further security against sickness, and in several instances with most notable absence of slight ailments and indefinite febrile disturbances, which had in previous seasons been present.

Maclean, in his article in Quain's "Dictionary," speaks of water from malarial coasts, taken on shipboard, as a cause of malarial fever, in persons consuming it, who had not been exposed.

The exposure of milk, in cans, to the night air, on the many valley railroads converging in New York, at the milk stations, and as peddled around our streets in the early morning air, is another possible cause of infection. For this reason, sealed cans direct from the dairy are desirable, at least for invalids and delicate children susceptible to slight malarial influences.

2. The second reason for inferring malarial toxæmia is the occurrence of a characteristic malarial seizure—an initial chilliness, chill, or rigor; sudden elevation of temperature, fever of an hour or two duration, subsidence with sweating. Or initial chill, with pronounced fever, marked by remissions, with or without local congestions with each return of fever.

These two are the typical intermittent and remittent. The latter, it is well known, ultimately becomes intermittent, as convalescence is being established. The phenomena are not materially different in method of production or in sequence in the two diseases—chill is proportionate to the shock of malarial toxæmia, the fever period represents the disturbance of tissue metamorphosis resultant from the miasm in the blood; sweating or other colliquative change, as diarrhœa or diuresis, represent an effort at elimination. In intermittent, the fever is shorter, the interval long. In remittent, the fever persists and the remission is brief, or even not obvious, but ultimately lengthens as nature, either unaided or

aided by medication, completes the elimination of malaria from the system.

3. We are warranted in diagnosticating malaria, quite independently of the nature of the special symptoms, if they are clearly marked by periodicity of recurrence, or by periodicity of exacerbation.

4. A demonstrated periodicity of the temperature line, even though slight — fractional — if continued without other marked symptoms, plainly denotes malaria.

5. Changes in the size of the spleen and liver as shown by percussion and auscultatory percussion, when associated with history of malarial exposure, or former malarial seizures, lead to the inference of chronic malarial infection. But it must not be forgotten that without such history, especially if the enlargement of the liver be great, the two organs are more likely to be invaded by the waxy infiltrate. Both waxy spleen and ague cake are painless.

6. I place sixth and last the therapeutic argument. Invariable benefit derived from the use of antiperiodics, whether derivatives of cinchona bark, salicin, eucalyptus, or arsenic, goes to confirm the diagnosis. But if no periodicity in symptoms has existed, if no enlargement of spleen is present, even though lesser symptoms suggest malaria, the cure of the case does not prove that malaria is present. Quinine not only antagonizes or neutralizes malaria in the blood, but also controls hyperæmia, inflammation, and febrile temperature. It also acts as a stimulant to the nervous system and a tonic to the mucous membrane of the stomach and intestines.

Having stated the chief diagnostic rules for determining malaria, I desire to submit a list of diseases which are constantly being confounded with malaria by many practitioners. The error is one which may threaten any physician, however expert as a diagnostician, if a case be hastily observed, or infrequently visited, or carelessly recorded.

(*a*) Phthisis will certainly rank first in diagnostic importance. The most frequent error, and one which is

hardly justifiable in the case of adults, is to mistake the daily hectic of phthisis for quotidian intermittent. In this vicinity intermittent is so infrequently quotidian in the adult, as to always create scepticism as to the malarial nature of a daily chill and fever. Careful exploration of the chest will usually detect the tuberculization, the softening or cavity which create the pyrexia. In phthisis not only do patients long mislead themselves with the supposition that they are suffering from malaria, but physicians very frequently, either by oversight, or by being too willingly biassed by the patient's statements, fall into the same error. Acute miliary tuberculosis and marasmus also are occasionally, but less often, misinterpreted as forms of low continued malarial fever.

(*b*) The next frequent error, and a common one, at least in this community, is to overlook follicular tonsillitis, at least for one or two days, and mistake the sudden accession of chill, high fever, and general soreness of the muscles for an attack of acute malaria. The ultimate development of a painful throat is apt to correct the diagnosis. Follicular tonsillitis is in no true sense malarial. In endemics it is the common product of foul streets and gutters, and of sewer and house-pipe emanations; it is septic, not malarial. Individual cases are the result of catching cold, checked perspiration with associated indigestion. During the present season I have, at two different times, treated groups of eighteen and twenty cases of follicular tonsillitis in a child's day nursery; no inmate being exempt, yet no case of intermittent, or any symptom or group of symptoms characterized by periodicity, occurred either during or subsequent to these cases.

(*c*) The fact that continued fevers and the exanthemata at their outset are liable to be confounded with intermittent and remittent, all practitioners know. We are constantly compelled to exercise discretion, to defer the diagnosis until the special evidences of each disease have developed.

Typhoid will often present no typical temperature line, and remittent or malarial typhoid is inferred. But the second week will develop the typhoid spots, ochre-colored diarrhœa, and other symptoms of undoubted typhoid fever. Relapsing fever can scarcely be distinguished from remittent until the first respite, with subsequent recurrence, corrects the diagnosis. In children the passage of the time for the development of each exanthem successively clears the diagnosis.

(*d*) Inflammations of the pleura and pulmonary parenchyma may often be insidious, and at first devoid of pronounced physical signs. The diagnosis of malaria is then made, and often, in a degree, correctly, since malarial poison is a frequent cause of atypical pneumonia, either centric or localized, and is especially a cause of local dry pleurisy and pleuro-pneumonia. But if the subsequent full development of these inflammatory diseases is not marked by a continued periodicity, I should infer that the first diagnosis of malarial chill and fever was an error, to be retracted in favor of that of a non-malarial inflammation. Empyema, especially in children, and when localized, is often overlooked, and malaria diagnosticated. Physical examination. Bronchitis is not likely to be mistaken for any development of malaria, since it has so slight an initial chill, and so moderate elevation of temperature; and the substernal oppression and cough point to the true disease.

(*e*) Acute indigestion, especially in children and young adults, and those with mobile pulse and temperature will frequently produce a vascular excitement, with associated fever and even delirium, which simulate a more serious seizure, and which is often regarded as malarial. It is well in all such sudden cases to ascertain if the tongue be coated, the breath loaded, the stomach foul; if vomiting, diarrhœa, or constipation exist, and if errors of diet have been committed. A dose of oil or other quick purge is indicated, and the cure is instantaneous; whereas, resort to quinine in such cases will not particu-

larly reduce temperature, and will indefinitely protract an otherwise speedy cure.

(*f*) But more frequent than the above-named, and perhaps than all other sources of error, indeed an every-day error in this community, and, so far as I can learn, in all sections of the country, is the habit of ascribing the manifold symptoms of chronic indigestion, of sluggish liver, and constipated bowels to malaria.

Ladies who are languid, tired, who suffer from cold extremities, vitiated appetite, and headache, are treated with quinine and its analogues, when they require only exercise, mild laxatives or enemata, regulated diet, and possibly a stomachic tonic for a brief time. Cases of lithæmia, with nervous flashes, confused head, depressed spirits, sense of fatigue, yield promptly to lactic acid, buttermilk, kumyss, or to nitro-muriatic acid, after previous long-continued and unavailing antimalarial medication.

(*g*) Anæmia, debility from overwork, nervous exhaustion, all characterized by the vague discomforts and localized pains, or neuralgia, which result from impoverished blood and deranged circulation, are too often hastily ascribed to malaria. The expenditure of more time and patience in analyzing chronic cases will obviate most of these mistakes.

(*h*) Lastly and with much emphasis, I refer to the error, largely of the past, yet still too prevalent, of misinterpreting post-partum chills and assuming their malarial nature. Most authors specify that women are more liable to malaria subsequent to confinement than before. With this assumption it has been customary until recently to interpret pronounced chills or alarming rigors, and sudden elevations of temperature in puerperal women, to malaria. I do not refer to the chills incident to the influx of the milk, inaugurating the so-called "milk fever." Even the latter seems to be materially lessened under the recently inaugurated system of obstetric antisepsis. It may be pretty safely stated that in non-malarial districts

and residences, the occurrence of chills and fever in the parturient woman is not determined by malaria, but invariably by sepsis, either from membranes or clots retained in utero, or by poisonous lochia. Heroic doses of quinine, it is true, will bring down the temperature in these cases, but it will speedily rise—having been influenced by quinine as an antipyretic, not as an antiperiodic—and will remain high or fluctuate at a dangerous elevation, until thorough antiseptic douching of the uterus and vagina secures its reduction. Even in malarial regions, and in women who have previously had malarial chills, the practitioner will do well not to ignore the greater probability that he is dealing with the results of sepsis from the secundines or lochia.

In attempting to formulate the conditions which justify a diagnosis of malaria, and in detailing the many diseases which are daily mistaken for malaria, I am not to be understood as underestimating the widespread influence of malaria in nearly all sections of the country, and the presence in every section of individuals who are suffering not only from its pronounced and typical forms, but also from varied atypical manifestations. It is too true that the error also is constantly made of treating anæmia, debility, neuralgia, and many other diseases without recognizing malaria as a possible cause. But the error is less serious in this direction, since the class of ailments so mistaken usually are not grave, nor the symptoms urgent, whereas the errors previously cited involve great hazard to life, as in the course of unrecognized phthisis or forming febrile and inflammatory diseases, or involve a protracted misconception of methods of diet and living, as in the indigestion and nervous exhaustion, or the needless sacrifice of a life as in puerperal septicæmia.

The physician who is undecided as to the merits of this argument, and strongly biassed in favor of malaria, certainly can afford to pursue the conservative course of more careful observation, and of rigid differential diagnosis, without abandoning his use of antimalarial agencies.

Much good must result from a closer study of the classes of cases which have heretofore been carelessly ascribed to malaria; if still found to be truly malarial, a more precise symptomatology of malaria will be created; if not malarial, new sources of septic infection may be disclosed, or further light thrown upon the still obscure laws of assimilation and excretion.